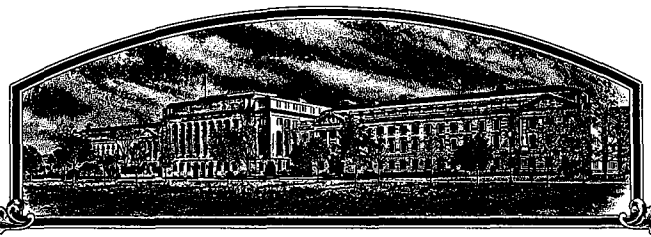

No. 9100265

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Holden's Foundation Seeds, Inc.

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF eighteen YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

CORN

'LH164'

In Testimony Whereof, *I have hereunto set my hand and caused the seal of the* Plant Variety Protection Office *to be affixed at the City of* Washington, D.C. *this* 31st *day of* August *in the year of our Lord one thousand nine hundred and* ninety-two.

Attest:

Kenneth A. Kem

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Edward Madigan

Secretary of Agriculture

FORM APPROVED: OMB 0581-0055, Expires 1/31/91

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions on reverse)

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) *(as it is to appear on the Certificate)*
Holden's Foundation Seeds, Inc.

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NO.
Ex2158

3. VARIETY NAME
LH164

4. ADDRESS *(street and no. or R.F.D. no., city, state, and ZIP)*
201 North Maplewood Ave.
P.O. Box 839
Williamsburg, IA 52361

5. PHONE *(Include area code)*
(319) 668-1100

FOR OFFICIAL USE ONLY

PVPO NUMBER
9100265

FILING
Date: Sept. 19, 1991
Time: ☐ A.M. ☐ P.M.

FEES RECEIVED
Filing and Examination Fee: $2150.00
Date: Sept. 19, 1991
Certificate Fee: $250.00
Date: July 14, 1992

6. GENUS AND SPECIES NAME
Zea mays

7. FAMILY NAME *(Botanical)*
Gramineae

8. CROP KIND NAME *(Common Name)*
Corn, Field

9. DATE OF DETERMINATION
March 1989

10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION *(Corporation, partnership, association, etc.)*
Corporation

11. IF INCORPORATED, GIVE STATE OF INCORPORATION
Iowa

12. DATE OF INCORPORATION
1968

13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS
Mr. Mark Armstrong
Holden's Foundation Seeds, Inc.
P.O. Box 839
Williamsburg, IA 52361

PHONE *(Include area code)*: (319) 668-1100

14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED *(Follow INSTRUCTIONS on reverse)*

a. [X] Exhibit A, Origin and Breeding History of the Variety.
b. [X] Exhibit B, Novelty Statement.
c. [X] Exhibit C, Objective Description of Variety.
d. [X] Exhibit D, Additional Description of Variety.
e. [X] Exhibit E, Statement of the Basis of Applicant's Ownership.
f. [X] Seed Sample (2,500 viable untreated seeds). Date Seed Sample mailed to Plant Variety Protection Office 9/16/91
g. [X] Filing and Examination Fee ($2,150) made payable to "Treasurer of the United States."

15. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? *(See section 83(a) of the Plant Variety Protection Act.)*
☐ YES *(If "YES," answer items 16 and 17 below)* [X] NO *(If "NO," skip to item 18 below)*

16. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?
☐ YES [X] NO

17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?
☐ FOUNDATION ☐ REGISTERED ☐ CERTIFIED

18. DID THE APPLICANT(S) PREVIOUSLY FILE FOR PROTECTION OF THE VARIETY IN THE U.S.?
☐ YES *(If "YES," through* ☐ Plant Variety Protection Act ☐ Patent Act: Give date: _____ .)
[X] NO

19. HAS THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES?
JMS 5/5/92
[X] YES (If "YES," give names of countries and dates)
[X] NO

20. The applicant(s) declare(s) that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable.

The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in section 41, and is entitled to protection under the provisions of section 42 of the Plant Variety Protection Act.

Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF APPLICANT *[Owner(s)]*	CAPACITY OR TITLE	DATE
[signature]	President	9/16/91
SIGNATURE OF APPLICANT *[Owner(s)]*	CAPACITY OR TITLE	DATE

Exhibit A

ORIGIN AND BREEDING HISTORY OF THE INBRED

LH164 was developed by selfing hybrid plants from a population of Pioneer Hybrid variety 3901 and using the pedigree system of plant breeding. On the following pages are a summary and description of the development of LH164. Also included are copies of pages from the nursery books of Holden's Foundation Seeds, Inc. The rows associated with the development of LH164 have been highlighted. Please note, LH164 was finished as an inbred in 1986. No selection work was performed thereafter; however, due to inadequate testing seed quantities, the line was grown three more generations before an adequate quantity of testing seed was obtained.

Attached is a statement from the originating plant breeder, Richard Miller, stating that the line is uniform, stable, and free of variance from within the population.

Exhibit A: Yield, stalk quality, root quality, disease tolerance, late plant greenness, late plant intactness, ear retention, pollen shedding ability, silking ability and corn borer tolerance were the selection criteria used to determine the rows from which ears were selected.

from applicant letter of 4/30/92.
JMS 5/5/92

Exhibit A

ORIGIN AND BREEDING HISTORY OF THE INBRED

LH164 = Ex2158 = P3901 ⊠

Row/Farm	Pedigree	Location	Year
Jones	LH164	Iowa	1990
8484-8493	Ex2158	Iowa	1989
11340	P3901 @ 7	Iowa	1988
26268	P3901 @ 7	Hawaii	1987-1988
12040	P3901 @ 7	Iowa	1987
8797	P3901 @ 7	Iowa	1986
13781	P3901 @ 6	Iowa	1985
14537	P3901 @ 5	Hawaii	1984-1985
1763	P3901 @ 4	Iowa	1984
9964	P3901 @ 3	Hawaii	1983-1984
1971	P3901 @ 2	Iowa	1983
833	P3901 @ 1	Hawaii	1982-1983
28988	P3901	Iowa	1982

Exhibit A

UNIFORMITY STATEMENT

I have observed LH164 during the last three generations it has been increased: 1988 Iowa nursery row 11340; 1989 Iowa nursery rows 8484-8493; 1990 Iowa production, Jones field. In each of these increases seeds from the previous generation were planted. The line, LH164, is very stable and uniform. The line is also free of variance from within the population.

Richard J. Miller
Plant Breeder
Holden's Foundation Seeds, Inc.

Exhibit B

NOVELTY STATEMENT

LH164 most closely resembles the corn inbred line LH163. However, the most distinguishing differences are anther color and silk color. The anther color of LH164 is purple and the silk color is red. The anther color of LH163 is yellow and the silk color is green.

The glume color of LH164 is green with a purple stripe while the glume color of LH163 is green with a brown margin.

FORM APPROVED. OMB NO. 40-R3712

FORM GR-470-28
(2-15-74)

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
GRAIN DIVISION
HYATTSVILLE, MARYLAND 20782

EXHIBIT C
(Corn)

OBJECTIVE DESCRIPTION OF VARIETY

CORN *(ZEA MAYS)*

NAME OF APPLICANT(S)
Holden's Foundation Seeds, Inc.

ADDRESS *(Street and No. or R.F.D. No., City, State, and ZIP Code)*
201 N. Maplewood Avenue
P.O. Box 839
Williamsburg, IA 52361

FOR OFFICIAL USE ONLY
PVPO NUMBER 9100265
VARIETY NAME OR TEMPORARY DESIGNATION
LH164

Place the appropriate number that describes the varietal character of this variety in the boxes below.
Place a zero in first box (e.g. [0][8][9] or [0][9]) when number is either 99 or less or 9 or less.

1. TYPE:

[2] 1 = SWEET 2 = DENT 3 = FLINT 4 = FLOUR 5 = POP 6 = ORNA. ,ENTAL

2. REGION WHERE BEST ADAPTED IN THE U.S.A.:

[2] 1 = NORTHWEST 2 = NORTHCENTRAL 3 = NORTHEAST 4 = SOUTHEAST
5 = SOUTHCENTRAL 6 = SOUTHWEST 7 = MOST REGIONS

3. MATURITY (In Region of Best Adaptability):

(Under "comments" (pg. 3) state how heat units were calculated)

[9][5]	DAYS FROM EMERGENCE TO 50% OF PLANTS IN SILK	[1][5][5][2] HEAT UNITS
[0][0]	DAYS FROM 50% SILK TO OPTIMUM EDIBLE QUALITY	[0][0][0][0] HEAT UNITS
[0][0]	DAYS FROM 50% SILK TO HARVEST AT 25% KERNEL MOISTURE	[0][0][0][0] HEAT UNITS

4. PLANT:

[1][6][5] CM. HEIGHT (To tassel tip)

[0][4][9] CM. EAR HEIGHT (To base of top ear)

[1][4] CM. LENGTH OF TOP EAR INTERNODE

Number of Tillers:

[1] 1 = NONE 2 = 1–2 3 = 2–3 4 = > 3

Number of Ears Per Stalk:

[1] 1 = SINGLE 2 = SLIGHT TWO-EAR TENDENCY
3 = STRONG TWO-EAR TENDENCY 4 = THREE-EAR TENDENCY

Cytoplasm Type:

[1] 1 = NORMAL 2 = "T" 3 = "S" 4 = "C" 5 = OTHER (Specify) _____

5. LEAF (Field Corn Inbred Examples Given):

Color:

[2] 1 = LIGHT GREEN (HY) 2 = MEDIUM GREEN (WF9) 3 = DARK GREEN (B14) 4 = VERY DARK GREEN (K166

Angle from Stalk (Upper half):

[2] 1 = < 30° 2 = 30–60° 3 = > 60°

Sheath Pubscence:

[3] 1 = LIGHT (W22) 2 = MEDIUM (WF9)
3 = HEAVY (OH26)

Marginal Waves:

[2] 1 = NONE (HY) 2 = FEW (WF9) 3 = MANY (OH7L)

Longitudinal Creases:

[2] 1 = ABSENT (OH51) 2 = FEW (OH56A)
3 = MANY (PA11)

Width:

[0][9] CM. WIDEST POINT OF EAR NODE LEAF

Length:

[0][6][3] CM. EAR NODE LEAF

[1][1] NUMBER OF LEAVES PER MATURE PLANT

9100265

6. TASSEL:

[1 4] NUMBER OF LATERAL BRANCHES

Branch Angle from Central Spike:

[2] 1 = < 30° 2 = 30–40° 3 = > 45°

Pedunncle Length:

[0 6] CM. FROM TOP LEAF TO BASAL BRANCHES

Pollen Shed:

[3] 1 = LIGHT (WF9) 2 = MEDIUM 3 = HEAVY(KY21)

[4] Anther Color:
[6] Glume Color:
1 = YELLOW 2 = PINK 3 = RED 4 = PURPLE 5 = GREEN
6 = OTHER (Specify) green with purple

Pollen Restoration for Cytoplasms (0 = Not Tested, 1 = Partial, 2 = Good)

[0] "T" [0] "S" [0] "C" [0] OTHER (Specify Cytoplasm and degrees of restoration) _____

7. EAR (Husked Ear Data Except When Stated Otherwise):

[1 4] CM LENGTH [3 8] MM. MID-POINT DIAMETER [6 6] GM. WEIGHT

Kernel Rows:

[2] 1 = INDISTINCT 2 = DISTINCT [1 4] NUMBER

[1] 1 = STRAIGHT 2 = SLIGHTLY CURVED 3 = SPIRAL

Silk Color (Exposed at Silking Stage):

[4] 1 = GREEN 2 = PINK 3 = SALMON 4 = RED

Husk Color:

[1] FRESH
[6] DRY
1 = LIGHT GREEN 2 = DARK GREEN 3 = PINK
4 = RED 5 = PURPLE 6 = BUFF

Husk Extention: (Harvest Stage)

[2] 1 = SHORT (Ears Exposed) 2 = MEDIUM (Barely Covering Ear)
3 = LONG (8–10CM Beyond Ear Tip)
4 = VERY LONG (> 10 CM)

Husk Leaf:

[1] 1 = SHORT (< 8 CM) 2 = MEDIUM (8–15 CM)
3 = LONG (> 15 CM)

Shank:

[1 3] CM LONG [10] NO. OF INTERNODES

Position at Dry Husk Stage:

[1] 1 = UPRIGHT 2 = HORIZONTAL 3 = PENDENT

Taper:

[2] 1 = SLIGHT 2 = AVERAGE 3 = EXTREME

Drying Time (Unhusked Ear):

[2] 1 = SLOW 2 = AVERAGE 3 = FAST

8. KERNEL (Dried):

Size (From Ear Mid-Point):

[1 1] MM LONG [0 8] MM. WIDE [0 4] MM. THICK

Shape Grade (% Rounds)

[4] 1 = < 20 2 = 20–40 3 = 40–60 4 = 60–80 5 = > 80

8

9100265

8. KERNEL (Dried) :

[8] **Pericarp Color:** 1 = COLORLESS 2 = RED-WHITE CROWN 3 = TAN 4 = BRONZE 5 = BROWN 6 = LIGHT RED 7 = CHERRY RED 8 = VARIEGATED (Describe) light bronze at pedicel becoming colorless at crown

[1] **Aleurone Color:** 1 = HOMOZYGOUS 2 = SEGREGATING (Describe) _____

[1] 1 = WHITE 2 = PINK 3 = TAN 4 = BROWN 5 = BRONZE 6 = RED 7 = PURPLE 8 = PALE PURPLE 9 = VARIEGATED (Describe) _____

[3] **Endosperm Color:** 1 = WHITE 2 = PALE YELLOW 3 = YELLOW 4 = PINK-ORANGE 5 = WHITE CAP.

Endosperm Type:

[3] 1 = SWEET (su1) 2 = EXTRA SWEET (sh2) 3 = NORMAL STARCH 4 = HIGH AMYLOSE STARCH 5 = WAXY STARCH 6 = HIGH PROTEIN 7 = HIGH LYSINE 8 = OTHER (Specify) _____

[2][5] GM. WEIGHT /100 SEEDS (Unsized Sample)

9. COB:

[2][7] MM. DIAMETER AT MID-POINT

Strength:

[2] 1 = WEAK 2 = STRONG

Color:

[3] 1 = WHITE 2 = PINK 3 = RED 4 = BROWN 5 = VARIEGATED 6 OTHER (Specify) _____

10. DISEASE RESISTANCE (O = Not Tested, 1 = Susceptible, 2 = Resistant):

[0]	STALK ROT (Diplodia)	[0]	STALK ROT (Fusarium)	[0]	STALK ROT (Gibberella)
[1]	NORTHERN LEAF BLIGHT	[0]	SOUTHERN LEAF BLIGHT	[0]	SMUT
[0]	SOUTHERN RUST H. Turcicum Race 2	[0]	CORN SMUT	[0]	BACTERIAL WILT
[0]	BACTERIAL LEAF BLIGHT	[0]	MAIZE DWARF MOSAIC	[0]	STUNT
[0]	OTHER (Specify)				

11. INSECT RESISTANCT (O = Not Tested, 1 = Susceptible, 2 = Resistant):

[0]	CORNBORER	[0]	EARWORM	[0]	SAPBEETLE	[0]	APHID
[0]	ROOTWORM (Northern)	[0]	ROOTWORM (Western)				
[0]	ROOTWORM (Southern)	[0]	OTHER (Specify) _____				

12. VARIETIES MOST CLOSELY RESEMBLING THAT SUBMITTED FOR THE CHARACTERS GIVEN:

CHARACTER	VARIETY	CHARACTER	VARIETY
Maturity	LH61	Kernel Type	LH163
Plant Type	LH163	Quality (Edible)	
Ear Type	LH163	Usage	LH85

REFERENCES:

U.S. Department Agriculture. Yearbook 1937.

Corn: Culture, Processing, Products. 1970 Avi Publishing Company, Westport, Connecticut. (Numerous (Authors)

Emerson, R.A., G.W. Beadle, and A.C. Fraser. A Summary of Linkage Studies in Maize.Cornell A.E.S., Mem. 180. 1935.

The Mutants of Maize. 1968. Crop Science Society of America. Madison, Wisconsin.

Stringfield, G.H. Maize Inbred Lines of Ohio. Ohio A.E.S. Bul. 831. 1959.

Butler, D.R. 1954 – A System for the Classification of Corn Inbred Lines – PhD. Thesis, Ohio State University.

COMMENTS:

$$GDD = \frac{Tmax + Tmin}{2} - 50^{\circ}F \qquad Tmax \leq 86^{\circ}F \qquad Tmin \geq 50^{\circ}F$$

9

Exhibit D

ADDITIONAL DESCRIPTION OF THE INBRED

LH164 is an early-season field corn inbred which flowers similarly to LH61. LH164 sheds an ample amount of pollen and should make a very good male in the seed production field. Disease ratings were taken on a 1 to 9 scale with 1 being excellent and 9 being poor.

Initial Disease Rating	Inbred Line	
	LH164	LH85
Helminthosporium Turcicum Race 2	S4	S8

S=Susceptible Lesion Type R=Resistant Type Lesion

LH164 produces the best hybrids when crossed with early stiff stalk lines, but combines well with several different corn families. The hybrids have slightly larger diameter ears, and have lower harvest moisture than comparable LH85 hybrids. In the fall while the plant maintains good stay green, the husks turn brown and open.

LH164

Ex2158 P3901

LH164 produces the best hybrids when crossed with early stiff stalk lines, but combines well with several different corn families. The hybrids have slightly larger diameter ears, and have lower harvest moisture than comparable LH85 crosses. In the fall while the plant maintains good stay green, the husks turn brown and opens. LH164 blooms similar to LH61 and sheds ample pollen. Disease ratings were taken on a 1 to 9 scale with 1 being excellent and 9 being poor.

Initial Disease Rating --	Inbred Line LH164	LH85
Northern Race 2	S4	S8

S=Susceptible Lesion Type R=Resistant Lesion Type

Grouped Overall Comparisons to Standards

HYBRID NAME	NUM LOC	PEDIGREE	TEST GROUP	YIELD	% HOH	Y/M QUOT	POPU-LATION	% STALK	% ROOT	% DROP
H1420103	8	LH164 x LH85	136	133	20.80	6.41	23,912	4	3	0
		AS COMPARED TO:								
H1489900		LH220 x LH85		-3	-.54	+.02	+208	+2	+3	0
H1420005		LH163 x LH85		-1	-.28	+.05	+406	+2	+1	0
H1469807		LH146 x LH85		-3	-.18	-.09	+104	+1	+2	0
H1469803		LH85 x LH145		-4	+.97	-.52	+516	0	0	0
H1420100	6	CM105 x A665)(LH164	137	140	19.14	7.30	23,806	2	0	0
H1469807		LH146 x LH85		-4	-1.31	+.26	-529	-1	0	0
H1509900		A554 x CM105		+11	-.91	+.90	-529	-1	0	0
H1469803		LH85 x LH145		+15	+.64	+.55	-176	-2	0	-1
H1527102		LH162 x LH145		+11	+.68	+.35	-478	-1	-1	0
H1420101	6	LH145 x LH164	137	147	18.34	7.99	24,335	3	0	0
H1469807		LH146 x LH85		+3	-2.10	+.95	0	-1	0	0
H1509900		A554 x CM105		+18	-1.70	+1.59	0	0	0	0
H1469803		LH85 x LH145		+22	-.16	+1.24	+354	-1	0	0
H1527102		LH162 x LH145		+18	-.12	+1.04	+52	0	-1	0
H1420102	6	LH146 x LH164	137	143	20.75	6.88	24,301	1	0	0
H1469807		LH146 x LH85		-1	+.30	-.17	-34	-2	0	0
H1509900		A554 x CM105		+14	+.70	+.47	-34	-1	0	0
H1469803		LH85 x LH145		+18	+2.25	+.12	+319	-3	0	-1
H1527102		LH162 x LH145		+14	+2.29	-.08	+17	-2	-1	0

//

Exhibit E

STATEMENT OF THE BASIS OF APPLICANT'S OWNERSHIP

Holden's Foundation Seeds, Inc., Williamsburg, Iowa, is the sole owner and breeder of the LH164 corn inbred line for which it solicits a certificate of protection.